INSTRUCTION MANUAL

MODELS 172, 173

REGULATED POWER SUPPLIES

FOR SERIAL #_____

Quan-Tech

DIVISION OF KMS INDUSTRIES, INC.

INSTRUMENTS • AMPLIFIERS • NOISE INSTRUMENTATION

INSTRUCTION MANUAL

MODELS 172, 173

REGULATED POWER SUPPLIES

FOR SERIAL #_____

Q U A N - T E C H
DIVISION OF KMS INDUSTRIES, INC.

43 SO. JEFFERSON ROAD WHIPPANY, NEW JERSEY 07981

201-887-5508

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be tested as soon as it is received. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to us. We will then advise you of the disposition to be made of the equipment and arrange for repair or replacement. Include model number and serial number when referring to this instrument for any reason.

WARRANTY

Quan-Tech Laboratories, Inc. warrants each instrument manufactured by them to be free from defects in material and workmanship. Our liability under this warranty is limited to servicing or adjusting any instrument returned to the factory for that purpose and to replace any defective parts thereof. Electronic tubes and batteries are specifically excluded from any liability. This warranty is effective for one year after delivery to the original purchaser when the instrument is returned, transportation charges prepaid by the original purchaser, and when upon our examination it is disclosed to our satisfaction to be defective. If the fault has been caused by misadjustments, misuse, or abnormal conditions of operation, repairs will be billed at cost. In this case, an estimate will be submitted before the work is started.

Calibration checks of this instrument can easily be made in accordance with the instruction manual. Routine readjustments should never be attempted. If, however, the instrument has been damaged and requires recalibration or alignment, explicit calibration procedures as defined in the instruction manual must be followed.

If any fault develops, the following steps should be taken:

1. Notify us, giving full details of the difficulty, and include the model number and serial number. On receipt of this information, we will give you service data or shipping instructions.

2. On receipt of shipping instructions, forward the instrument prepaid, to the factory. If requested, an estimate of the charges will be made before the work begins provided the instrument is not covered by the warranty.

SHIPPING

The instruments should be packed in their original containers, or in a strong exterior container and surrounded by two inches of shock absorbing material.

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43 SOUTH JEFFERSON ROAD WHIPPANY, NEW JERSEY 07981

201-887-5508

MODELS 172, 173

REGULATED POWER SUPPLIES

GENERAL:

The Quan-Tech Regulated Power Supplies, Models 172 and 173 are extremely compact, closely regulated supplies. The two models are similar, differing primarily in their output current. The Model 172 provides an output current of 0.2 amp; the Model 173, an output current of 0.4 amp.

Both the Model 172 and 173 are available in three styles, as differentiated by the suffix letter following the model number;

Suffix "B" indicates the bench model, equipped with 3-wire line cord, front panel On-Off switch and calibrated output voltage control

Suffix "C" indicates models having input and output connections through a standard octal plug, screwdriver output voltage adjustment, and provision for remote programming.

Suffix "T" indicates models having input and output connections at a terminal strip, and a screwdriver output voltage adjustment.

SPECIFICATIONS:

		172 SERIES
INPUT VOLTAGE:		105-125V, 50-60 cycles
OUTPUT VOLTAGE:		.0-32 VDC
OUTPUT CURRENT:		0.2 Amp.
REGULATION:	LINE,	Less than 3 Millivolts
	LOAD,	Less than 3 Millivolts
TRANSIENT RESPONSE:		Less than 50 Microseconds
RIPPLE:		Less than 250 Microvolts RMS
INTERNAL IMPEDANCE:		Less than 0.01 Ohm in series with 3 microhenries
TEMPERATURE RANGE:		0-50° C.
OVERLOAD PROTECTION:		Electronic Protection, short circuit proof
DIMENSIONS:		Height 3", Width 4", Depth 5"
WEIGHT:		3 Pounds

	173 SERIES
OUTPUT VOLTAGE:	0-32 VDC
OUTPUT CURRENT:	0.4 Amp.
TEMPERATURE RANGE:	0-40° C. for bench use; 0-50° C. with suitable heat sink.
DIMENSIONS:	Height 3 1/2", Width 5", Depth 5 1/2"
WEIGHT:	5 Pounds

Balance of specifications as listed for 172 Series

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OPERATION:

The Models 172 and 173 should be provided with adequate ventilation. Since maximum internal dissipation is encountered at high line voltage, minimum output voltage, and maximum output current, the maximum safe ambient temperature is dependent on operating conditions. We will be glad to advise you on maximum temperatures for specific applications.

The Models 172C and 173C may be remotely programmed over their entire output voltage range at approximately 50 ohms per volt by following the directions on the nameplate.

MAINTENANCE AND REPAIR:

Most of the components in the Models 172 and 173 are standard commercial components available locally. Special parts can be obtained from Quan-Tech Laboratories.

The variable adjustments are available by removing the six screws holding the bottom plate. The printed circuit board may be completely withdrawn for service by removing the bottom and rear partition.

In replacing components on the printed circuit board, the iron should be only hot enough to make a clean solder connection. Avoid pressure that might push the copper away from the board while hot.

Typical voltage values are indicated on the schematic diagram. Moderate variations may be expected from unit to unit, but large variations or polarity reversals indicate trouble.

CIRCUITRY:

The Power Supply circuit consists of:

1. The main rectifier and filter.
2. A solid state, regulated reference and bias supply using Zener diode voltage reference.
3. A three stage transistor regulator.
4. A transistor circuit that limits the maximum output current to about 130-150% of full rated current.

Complete overall degeneration and proper compensation provide extremely close regulation, low output impedance, and excellent transient response.

A fuse is provided in the primary of the power transformer in the event of component failure. The Model 172 uses a 1/4 A. slow-blow, and the Model 173 a 1/2 A. slow-blow.

SEMICONDUCTOR LEGEND

Changes and improvements in the semiconductor products available for commercial use necessitate type changes from time to time. To eliminate confusion and costly paperwork, many of these changes will be covered in the following legend. The purpose of this legend is to acknowledge the fact that the type number on a semiconductor found in a piece of equipment will not necessarily correspond with the type number given on the schematic diagram.

The legend is not intended to be an interchangeability list although in many cases good quality components* within a given category may be substituted with acceptable results. Normally, replacements should be made using components having the same type number as the component being replaced.

Those components bearing an asterisk on the schematic diagram are factory selected components and should be obtained from Quan-Tech Laboratories.

*It should be noted that the incoming inspection procedure followed at Quan-Tech Laboratories includes noise screening on most semiconductors.

TYPE # ON SCHEMATIC	TYPE # IN EQUIPMENT
T1480	2N1613
T1494	2N1613
1N703	1N748
1N709	1N753
1N2859	1N3253, 1N3254
1N2862	1N3254
1N482A	1N3604
1N3253	75A4
1N3254	75A4
2N396A	4JX1G759, 4JX1D653, 2N3644
2N414	2N396A, 4JX1G759, 4JX1D653, 2N3644
2N929	2N0N2, A642, 2N3566, A322, A324
2N1515	2N3644
2N1613	2N3566, 2N3643
2N2219	220N2, A642, 2N3566, A322, A324
2N2603	2N3250
2N3250	2N3644
2N270	2N3644
2N1306	2N3566
2N1304	2N3566
2N3250	2N3251
UC240	2N4869, 2N3819
2N3644	2N3250, 2N3251
2N3566	2N3643

SCHEMATIC LEGEND

k = 1000

⊘ = Screw Driver Adjustment

▭ = Front Panel Control

* = Factory Select

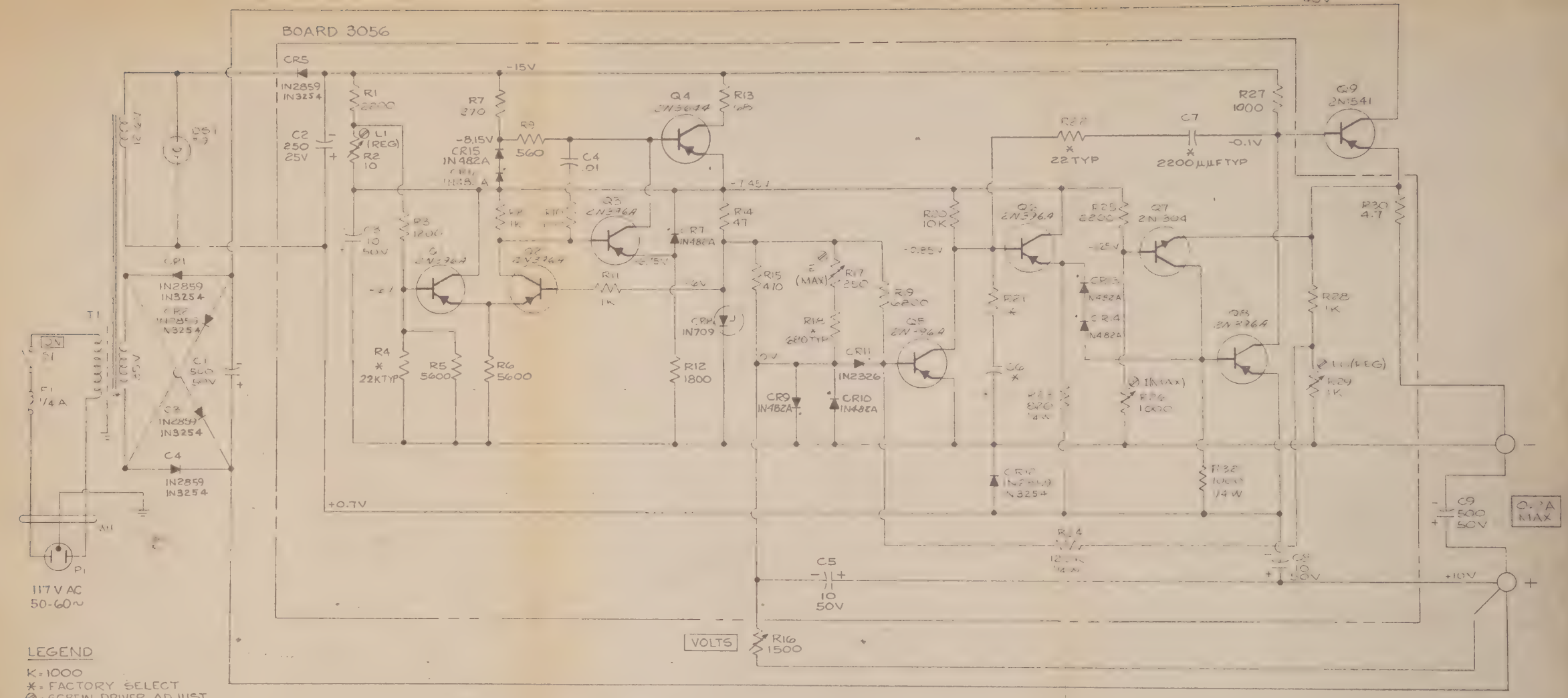
Unless Otherwise Specified:

All Resistances in Ohms

All Resistors 1/2 Watt

All Capacitances in Microfarads

8/20/69



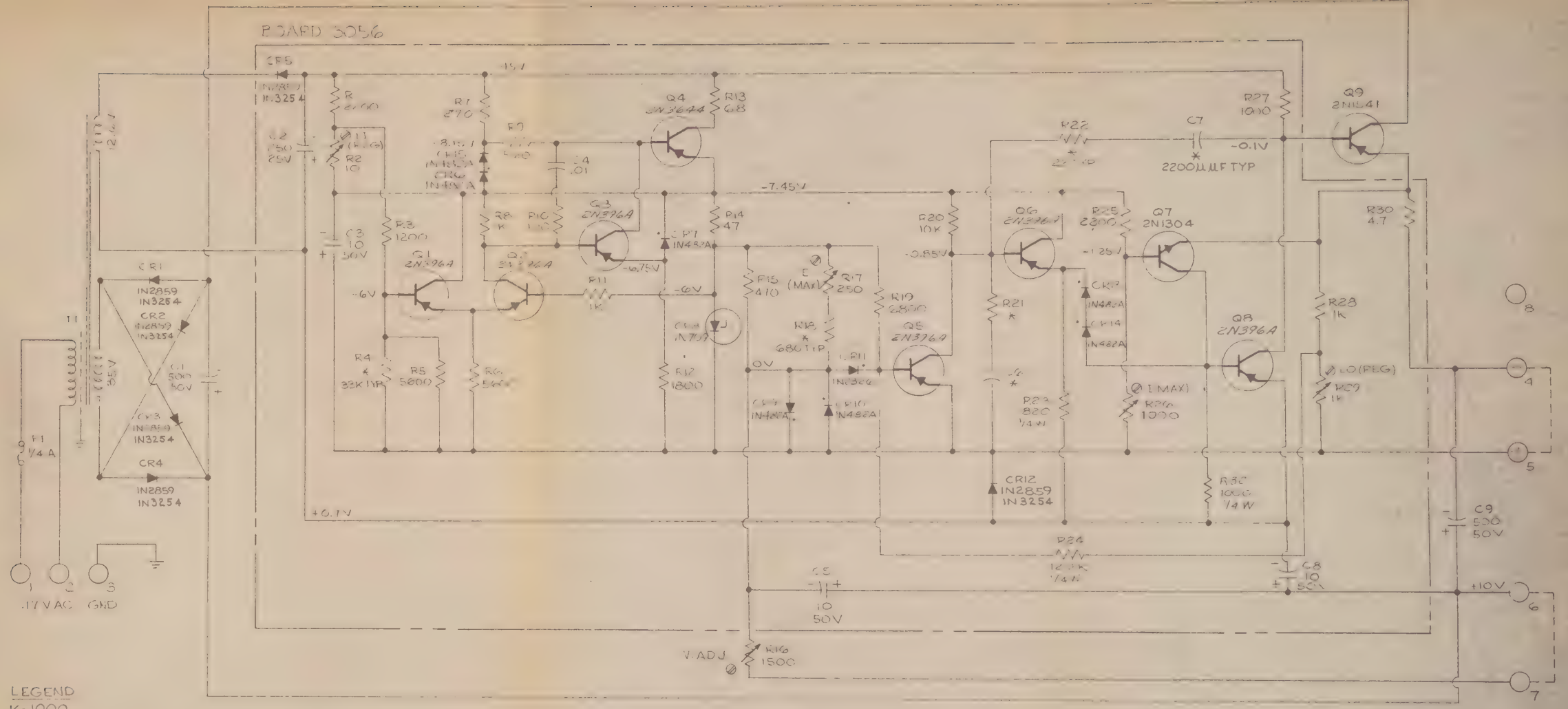
LEGEND

K = 1000
* = FACTORY SELECT
Ø = SCREW DRIVER ADJUST
▭ = FRONT PANEL CONTROL

UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCES IN OHMS
ALL RESISTORS 1/2 WATT
ALL CAPACITANCES IN MICROFARADS

NOTES:
1. TYPICAL VOLTAGES MEASURED FROM NEGATIVE OUTPUT TERMINAL.
2. LINE VOLTAGE 117V, OUTPUT SET TO 10 VOLTS, NO LOAD.

SCHEMATIC
POWER SUPPLY
MODEL 172-B
SERIAL 600 TO ____



LEGEND

K - 1000

* - FACTORY SELECT

Ø - SCREW DRIVER ADJUST

▭ - FRONT PANEL CONTROL

UNLESS OTHERWISE SPECIFIED:

- ALL RESISTANCES IN OHMS
- ALL RESISTORS 1/2 WATT

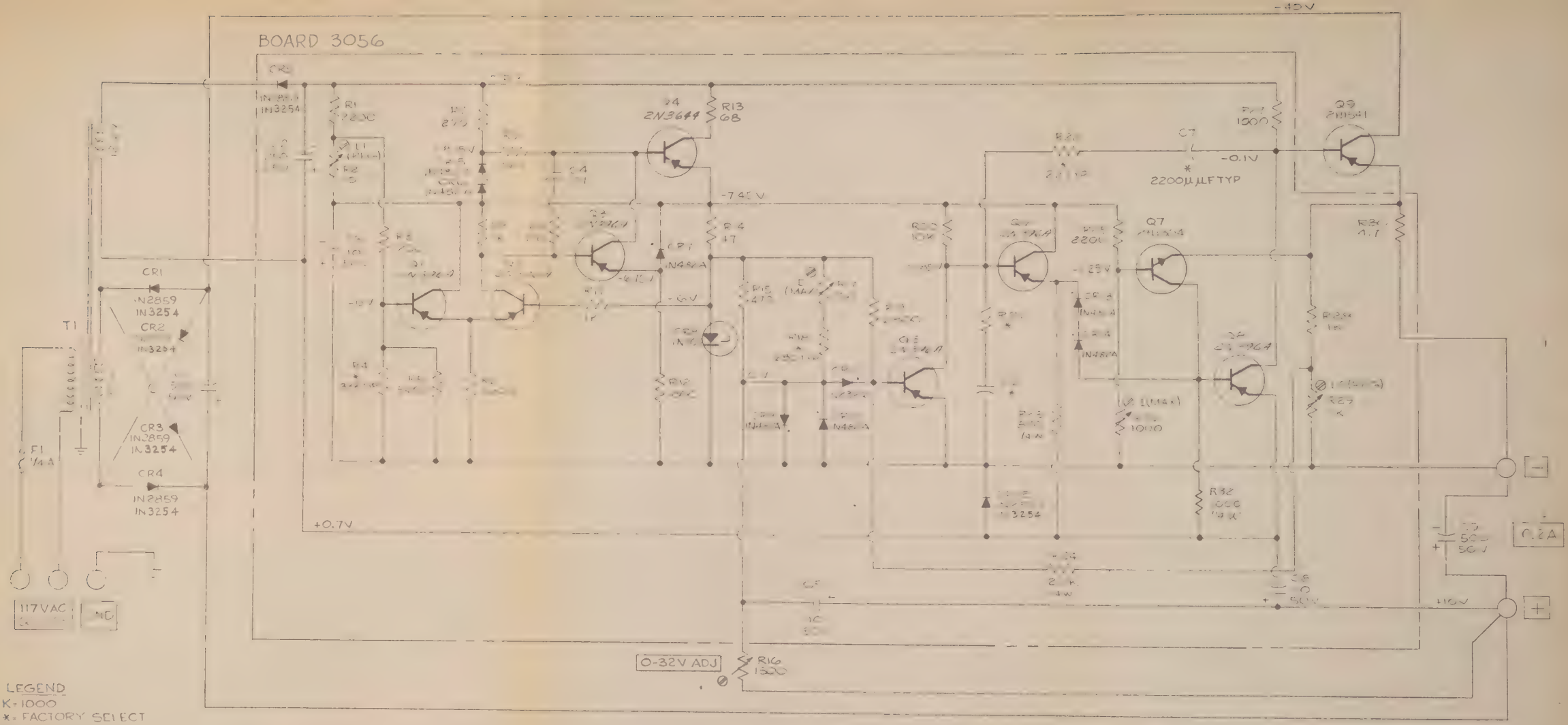
ALL CAPACITANCES IN MICROFARADS

NOTES:

1. TYPICAL VOLTAGES MEASURED FROM NEGATIVE OUTPUT TERMINAL.
2. LINE VOLTAGE 117 V. OUTPUT SET TO 10 VOLTS, NO LOAD.

SCHEMATIC
POWER SUPPLY
MODEL 172-C
SERIAL 600 TO ___

T-3417 F



LEGEND
K = 1000
* = FACTORY SELECT
⊘ = SCREW DRIVER ADJUST
[ ] = FRONT PANEL CONTROL

UNLESS OTHERWISE SPECIFIED:
ALL RESISTANCES IN OHMS
ALL RESISTORS 1/2 WATT
ALL CAPACITANCES IN MICROFARADS

NOTES:
1. TYPICAL VOLTAGES MEASURED FROM NEGATIVE OUTPUT TERMINAL.
2. LINE VOLTAGE 117V. OUTPUT SET TO 10 VOLTS, NO LOAD

SCHEMATIC
POWER SUPPLY
MODEL 172 T
SERIAL 600 TO ____
T-341-F

Quan-Tech®

DIVISION OF KMS INDUSTRIES, INC.

INSTRUMENTS • AMPLIFIERS • NOISE INSTRUMENTATION

SHORT FORM CATALOG

A Word About Noise Analysis

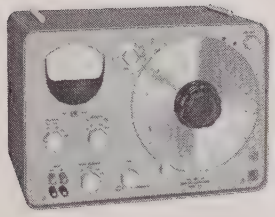
Since 1957 when it was founded, Quan-Tech Laboratories has specialized in the amplification and measurement of extremely low level signals approaching the theoretical limits of sensitivity. In order to build equipment of this sort it was necessary to select components having the lowest possible electrical noise for use in the most sensitive parts of the circuit. Noisier components were relegated to places where (it was thought) their noise would not interfere with proper operation. These noisy components exhibited a very high rate of failure compared to the quiet ones, so an intensive study of the reasons for these failures was undertaken.

Investigation showed that those components which exhibited excessive amounts of noise (particularly of the "1/f" type) compared to similar units, usually contained some defect or abnormality which could lead to early failure. This was equally true of resistors, transistors, and diodes, even though the failure mechanism might be different for each device.

This discovery led to the development of specific electrical noise measuring instruments for each type of component. Cooperative programs with manufacturers have proved beyond doubt that noise measurements, properly applied, can locate many types of failure-prone components before they are placed in the circuit, with resultant cost saving and increased reliability. Even manufacturers of such fiercely competitive items as automobile radios, electronic organs, and hearing aids have found noise screening cuts costs and improves product quality.

If you haven't already investigated the benefits of noise analysis, both for reliability and for very low noise applications, why not contact us or our local representative and get the full story?

Quan-Tech LABORATORIES, INC.



Model 303

WAVE AND SPECTRUM ANALYZER

Frequency range: 30 Hz to 100 KHz, semi-log frequency dial. **Bandpasses:** 10, 30, 100 and 1000 Hz at —3 db (100 and 1000 Hz bandwidths flat topped). **Sensitivity:** 100 μV to 300 V, FS. **Price:** $1700.

Model 2156

WAVE AND SPECTRUM ANALYZER

Similar to Model 303 except: **Frequency range:** 10 Hz to 30 KHz. **Bandpasses:** 3, 10, 30, 300 Hz. **Price:** $2375.

Model 2223

WAVE AND SPECTRUM ANALYZER

Similar to Model 303 except: **Frequency range:** 10 Hz to 200 KHz. **Bandpasses:** 10, 100, 750, 1000 Hz. **Price:** $3525.

TYPE 1110-1 SWEEP DRIVE ACCESSORY TO MODELS 303, 2156 AND 2223

Easily attached. Drives main tuning dial at 1.6 or 0.25 RPM. Dial stops included. **Price:** $75.00.

Model 304-TD

LOW FREQUENCY TRACKING WAVE AND SPECTRUM ANALYZER

Frequency range: 1 Hz to 5 KHz. **Frequency readout:** 5 place electronic digital display. **Bandpasses:** Flat-topped, 1, 10, and 100 Hz at —3 db. **Skirt selectivity:** 24 db per ½ bandwidth. **Sensitivity:** 30 μV to 300 V, FS. **Tuning:** Electronic, six selectable modes: manual, manual plus AFC, automatic sweep, tracking, search and track, external. **Outputs:** BFO, restored signal, sample of automatic sweep, analogs of meter reading and frequency setting, phase outputs for phase plot. Built-in master-slave capability for multi-channel analyzer systems. **Price:** $3575.

Model 304-T

Same as Model 304-TD except with 5000 division linear frequency dial in place of electronic display. **Price:** $3025.

Model 304

Same as Model 304-T except without AFC, tracking, or master-slave capabilities. **Price:** $2700.

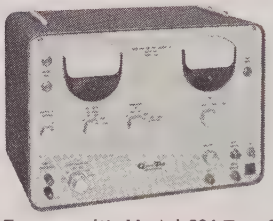
Model 305

TRACKING WAVE AND SPECTRUM ANALYZER

Similar to Model 304-TD except: **Frequency range:** 10 Hz to 50 KHz, 5000 division linear frequency dial. **Bandpasses:** 10, 100, and 1000 Hz. **Price:** $2800.

Model 305-D

Same as Model 305 except 5 place electronic digital frequency readout instead of frequency dial. **Price:** $3350.



Model 1304

SLAVE ANALYZER AND PHASEMETER

For use with Model 304-T or 304-TD in multi-channel phase locked analyzer systems. The Model 1304 has a built-in phasemeter but no tuning controls. Mechanical impedance and transfer function analysis is simplified. Bandwidths and sensitivity are the same as for the Model 304-TD. **Price:** $2050.

Model 1305

Similar to Model 1304, but for use with Model 305 or 305-D. **Price:** $2050.

Model 3304

CROSS SPECTRAL DENSITY ANALYZER

For use with the Models 304T and 1304 for computing cross spectral density. Values of Cxy, Qxy, and Gxy are presented on front panel meters. **Price:** $1800.

Model 3305

Similar to Model 3304, but for use with Models 305 and 1305. **Price:** $1800.

Model 350

HIGH FREQUENCY WAVE ANALYZER

Frequency range: 10 KHz to 10 MHz. **Frequency readout:** 5 place electronic digital display. **Bandpasses:** 4 KHz and 40 KHz at —3 db. **Sensitivity:** 10 μV to 10V, continuously variable precision capacitive attenuator with input overload indicator. **Outputs:** BFO, rectified signal envelope, and meter analog. **Price:** $2495.

All prices shown are F.O.B. Whippany, N. J. Prices and specifications subject to change without notice.

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Quan-Tech

- TRANSISTOR & DIODE NOISE ANALYZERS
- INTEGRATED CIRCUIT NOISE ANALYZER
- R.F. NOISE ANALYZERS

Model 2283
-2281

INTEGRATED CIRCUIT NOISE ANALYZER

This extremely versatile noise measuring system was designed primarily for measuring noise in linear IC's and Op Amps. **Bias voltages:** plus and minus 12V fixed, plus and minus 0 to 30V independently variable at 100 ma. **Noise spectral density:** 3 to 3000 nanovolts. **Filter frequencies:** 10 and 100 Hz, 1, 10, and 100 KHz measured simultaneously.
Price: **Model** 2283 Control Unit $1600.
Model 2181 Filter Unit $2500.

Model 2173C
-2181

TRANSISTOR NOISE ANALYZER

The most versatile unit available. Measures noise current and voltage at 10 and 100 Hz, 1, 10, and 100 KHz simultaneously. **Noise spectral density range:** 3 to 3000 nanovolts FS. **Base resistance range:** 0, 500, 1K, 10K, 100K, and 1M ohms plus external position. **Collector voltage range:** 0.3 to 60 volts. **Collector current range:** 0.3 μa to 30 ma. Also measures FET's.
Price: $4995.

Model 310

TRANSISTOR NOISE ANALYZER

Measures noise current and voltage at 100 Hz, 1 KHz and 10 KHz as well as I_{cbo}, I_{ebo} and beta. **Noise spectral density range:** 0.01 to 3 μV, FS. 1 to 300 pa, FS. **Collector Current range:** 0.05 to 30 ma. **Collector voltage range:** 0.1 to 30 V. **Base resistance range:** 0, 500, 1K, 10K, plus external position.
Price: $2725.

Model 311

Similar to above, except that collector current range is from 5 to 1000 μa for noise measurement in low-collector-current devices. Measures Gm instead of beta. Also measures FET's.
Price: $2725

Model 512

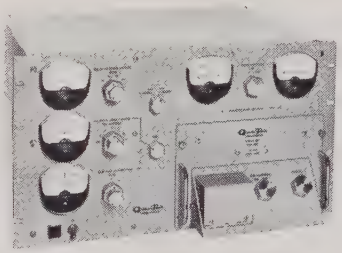
TRANSISTOR NOISE TEST SET

Measures broadband noise figure directly in db. **Noise bandwidth:** 15.7 KHz (—3 db at 10 Hz and 10 KHz). **Noise figure range:** 0 to 62 db. **Collector voltage range;** $\pm$ 3 to 30 volts. **Collector current range:** 10 μa to 1 ma. **Base resistance range:** 50, 500, 1K, 10K ohms plus external position. Also measures FET's.
Price: $1375.

Model 327

DIODE NOISE ANALYZER

Measures noise in back-biased semi-conductor diodes at 10 Hz and 1 KHz simultaneously. **Noise spectral density range:** 0.03 μV to 1 mV. **Test Voltage:** 0 to 500 V, continuously variable. **Test Current:** 0 to 100 ma continuously variable. Internally supplied ramp automatically sweeps test current and/or voltage within maximum ratings. A wide variety of outputs for data logging, external monitoring, actuating external equipment, etc.
Price: $3250.



Model 340

R.F. TRANSISTOR NOISE ANALYZER

Measures noise figure directly of transistors and FET's at radio frequencies. Plug-in heads available for test frequencies between 1 MHz and 60 MHz. **Noise figure range:** 0 to 40 db. **Base resistance range:** 50, 100, 200, 500, 1K, 2K, 5K ohms. **Collector voltage range:** $\pm$ 1 to 30 volts. **Collector current range:** 30 μa to 30 ma.

Price: $2500.

Model 1340

MODEL 1340 TRANSISTOR TEST HEADS FOR USE WITH MODEL 340

1340 — 1 MHz — 10.7 MHz **Price:** $1400.
1340 — 2 MHz — 45 MHz — 60 MHz **Price** $1800.

LINEAR I.C. TEST HEAD

Measures noise in integrated circuits at 10.7 MHz.
Price: $1800.

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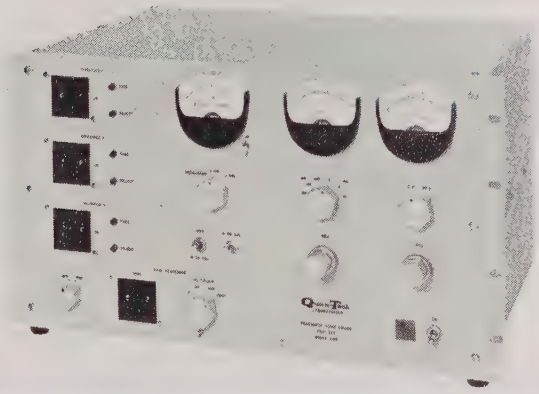
- TRANSISTOR NOISE TEST SYSTEMS
- RESISTOR NOISE TEST SETS
- SPECIAL INSTRUMENTS & SYSTEMS

Model 2310

AUTOMATIC TRANSISTOR NOISE TEST SYSTEM

Measures 1KHz, 10KHz, or broadband (—3db at 10 Hz and 10KHz) Noise Figure in 200 milliseconds. Front panel reject level settings and GO-NO-GO indicators. PASS and REJECT information at rear connector. **Collector voltage:** ± 5 to 30 volts. **Collector current:** 5μA to 10mA. **Noise Figure:** 0 to 20db. **Base resistance:** 50 ohms to 99K ohms.



Coming in 1970

(Tentative Specifications)

AUTOMATIC RESISTOR NOISE TEST SYSTEM

Automatically measures resistance to 0.1%, computes and applies rated power, and measures Noise Voltage or Noise Index in 1 second test cycle. Sequentially measures up to 20 different resistors on thick or thin film chips. Digital panel displays and BCD outputs of readings. **Range:** 10 ohms to 1 megohm.

SEMI-AUTOMATIC TRANSISTOR NOISE ANALYZER

Measures Noise Voltage or Noise Figure at up to six spot frequencies, 10Hz to 1MHz sequentially. Fast test cycle. Front panel programming and digital displays of readings, plus BCD outputs. May be fully automated.

AUTO-RANGING INSTRUMENTATION AMPLIFIER

Similar to Model 2220 but with gain ranging automatically from 78 to 0 db. Front panel electronic digital display of gain setting plus rear BCD output.

AUTO-RANGING LOG OUTPUT WAVE ANALYZERS

Similar to Model 304-305 series but with gain automatically ranging over 50 db. Log or linear output reading. Overall dynamic range 120 db. Front panel indication of gain setting plus rear BCD output.

AUTOMATIC LINEAR IC TEST SYSTEM

Similar to Model 2310 but for high-speed noise testing of linear IC's.

Model 315

RESISTOR NOISE TEST SET

Measures noise in resistors in conformance with specifications recommended by NBS and Method 308 of MIL STD 202B. **Test-resistor range:** 10Ω to 22 meg Ω. **Measurement range:** 0.6 μV in a decade to 1000 μV in a decade. **Outputs:** Sample of noise voltage; analogs of meter readings. External cable supplied for remote location of test jig.

Price: $2375.

Model 2136 RESISTOR NOISE TEST SET

Similar to above, but measures resistors down to 10 Ω. **Price:** $2550.

Special Instruments and Systems

Quan-Tech manufactures a great many "specials", ranging from one unit only to production quantities on an OEM basis. We can supply not only automatic measuring systems, but the automatic component handling equipment to go with them. We will assume system responsibility and are prepared to interface our systems with computers and other data programming, handling, and storage equipment. Your inquiry will receive a prompt reply.

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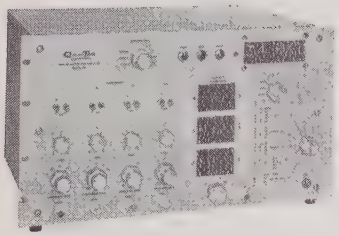
QuanTech

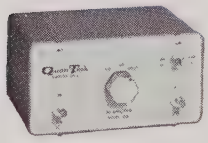
- SOLID STATE AMPLIFIERS
- AMPLITUDE DISTRIBUTION ANALYZER
- RANDOM NOISE GENERATOR



Model 318

IMPULSE DISTRIBUTION ANALYZER

Determines amplitude & width of random or repetitive pulses, and stores the number of times that pulses occur within pre-selected amplitude or width ranges. 4 input channels, 4 amplitude threshold level controls, 3 adjustable time gates and 4 memory banks. Sampling time is selectable. **Frequency Response:** Dc to 15 MHz. **Amplitude Threshold sensitivity:** −10dBm to −60dBm, adjustable each channel, positive and negative inputs. **Input Impedance:** 75Ω, 135Ω, 600Ω switch selected. **Signal width Analysis:** 100 nanosecs to 99.9 millisecs in 4 decade ranges. Adjustable width thresholds 0-t_1; 0-t_2; 0-t_3; 0-∞. **Sampling times:** 1 sec; 1 min; 1 hr; manual timing, Ext. program. **Data Readout:** 4 digit visual; BCD printer output. **Price:** $4,500.



Model 206B

SELECTABLE GAIN AC AMPLIFIER

Bandwidth: 1 Hz to 100 KHz (within 0.5 db); — 3 db at 500 KHz. **Typical noise spectral density:** 5 x 10^{-9} V and 3 x 10^{-12} A at 1 KHz. **Gain:** 10, 100, & 1000, selectable at front panel; **Power:** 105-125 V AC or optional self-contained battery pack (automatically recharging). **Price:** $200. Batteries $35.

Model 2220

INSTRUMENTATION AMPLIFIER

Modular amplifiers mount 8 units in a 7" rack panel. **Voltage gain:** 0 to 80 db in 5 db steps. **Controlled frequency characteristics:** (selected by plug-in cards) voltage gain flat 10 Hz to 100 KHz or 10 Hz to 20 KHz, rising 3 db/octave 10 Hz to 100 KHz or 6 db/octave 10 Hz to 20 KHz. **Price:** $590

*DIGITAL OUTPUTS AVAILABLE

Model 317

AMPLITUDE DISTRIBUTION ANALYZER

Determines amplitude-probability distribution of random signals. **Amplifier response:** 3 db down at approx. 12 Hz and 1 MHz; **Switching rate:** 5 MHz. **Amplitude ranges:** 100%, 10%, 1% FS; Normal or "inverted" operation; provision for external sweep of level. **Price:** $495.

Model 317B

PROBABILITY DENSITY ANALYZER

Measures manually or plots automatically amplitude probability density or cumulative probability functions of random, complex, and repetitive signals. **Frequency Range:** DC or 10 Hz to 1.75 MHz. **Sweep:** −3 sigma to +3 sigma, automatic or manual. Gated clock pulse for low probability density. **Price:** $990.

Model 420

RANDOM NOISE GENERATOR

Stable "white" noise output having true gaussian amplitude distribution. **Frequency range:** DC to 100 KHz; **Output spectral density:** 0.01 to 1000 μV, continuously variable, calibrated; **DC offset:** less than 10 mV at max. output. **Price:** $700

Model 421

RANDOM NOISE GENERATOR

Similar to Model 420 but covering higher frequencies. **Frequency Range:** 10 KHz to 12.5 MHz flat ±0.5 db. **Output Spectral Density:** .02 to 300 μV, continuously variable, calibrated, into 75 ohms. (1.34V RMS maximum for full bandwidth) **Price:** $1100.

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Quan-Tech Sales Representatives

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VECTOR SALES, INC.
774 Pleasant St.
Belmont, Mass. 02178
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